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Brexit and transplantation research: EU funding and scientific collaborations

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Abbreviations

CORDIS, Publications Office of the European Union

ERC, European Research Council

EU, European Union

IQR, Inter Quartile Range

NHS, National Health Service

UK, United Kingdom

USA, United States of America

Q1, first quartile

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Introduction

It has been extensively argued that the United Kingdom's (UK) impending departure from the European Union, "Brexit", will have a major impact on the National Health Service (NHS) and the scientific community in the UK. The consequences of such a scenario are expected to be severe. Without an agreement on future cooperation and collaborations, prospects are that the UK will lose access to EU research funding programs, which could significantly weaken the British scientific community.

An immediate result of a no-deal Brexit will be a lack of access to the Horizon 2020 funding, EU's major research funding scheme. Within the Horizon 2020 program, UK-based researchers have access to around 1.3 billion Euros/year. Furthermore, the UK will probably not have access to the next EU research and innovation program "Horizon Europe", for which a budget of 94.1 to 120 billion Euros for the years 2021-2027 has been proposed.[1,2] In addition, UK-based foreign scientists, including postdoctoral researchers and graduate students, especially those from the EU, face uncertainty with regard to their legal status in the UK, threating research productivity. Moreover, a large group of researchers with an EU-background may consider returning to the European mainland, together with their personal funding and networks.[3]

With the above in mind, the consequences for the UK's involvement in transplantation research, in both Europe and globally, remain uncertain. The current literature does not provide an analysis of the UK's involvement in (transplantation) research projects and scientific publications, or on the consequences of global research collaborations.

Considering these major changes in the scientific landscape, and the fact that organ transplantation crosses many borders, we provide an overview of the allocation of EU-funding in the EU and the potential loss of international research collaborations in case of the Brexit.

EU-funding

Data on EU-funding for transplantation research, the dependence of the UK transplant community on EU-funding are impressive: From 1988 to 2019, 135 projects focusing on transplantation research received EU-funding, with a total budget of €292 million. The four largest EU countries, based on population size, received the largest part of the funding budget, with 26.8% (€78.3 million) going to Germany, 17.1% (€49.8 million) to France, 12.0% (€35.0 million) to Italy and 10.7% (€31.4 million) supporting UK research. Stratifying projects based on coordinating countries show that the UK is one of the five leading coordinators of EU funded projects on transplantation research (**Figure 1**) (France, 17.8%, Germany, 14.8%, UK, 14.1%, Spain, 10.4% and Italy, 9.6%).

These numbers indicate the strong link between EU-member states, with the involvement of UK-based researchers in 47.4% of the EU-funded projects (14.1% as coordinating country and 33.3% and participating country). Participation of UK based researchers was mostly seen in projects coordinated by Germany (28.9%), France (22.2%) and The Netherlands (13.3%) (**Figure 2**).

International collaborations

When assessing the scientific output in the transplantation community, the United States of America (USA) has been the largest contributor (17.277 publications) followed by Germany (3.179 publications) with the UK ranked third (2.766 publications).

Approximately 20% of scientific publications by UK primary authors are the result of an international collaboration, with a multiple/single country ratio of 0.19 (the number of publications by authors based in different countries as a proportion of the total number of publications). The worldwide median (IQR) multiple/single country ratio that characterizes the number of publications by authors from different countries as a proportion of the total number of publications, was 0.20 (0.15 – 0.30), with the highest ratio for Norway (0.35), the

lowest ratio for Pakistan (0.00) and a ratio of 0.19 for the UK (**Figure 3**). When reviewing these international collaborations, the USA (n=306, 7.6%), Denmark (n=139, 3.4%), Germany (n=121, 3.0%), the Netherlands (n=113, 2.8%) and France (n=102, 2.5%) were identified as the most relevant scientific allies of UK-based authors, four of which are part of the European Union (**Figure 4**). Including scientific publications as participating authors, UK based authors contributed to 4.017 (4.017/42.628, 9.4%) publications.

The impact of Brexit

Earlier publications on the effect of the dawning Brexit on international scientific collaborations and research output point to the high probability of a negative impact in the first years after Brexit.[4–6] In 2017 and 2019, Fahy et al. provided an extensive analysis of four possible Brexit scenarios, with (1) a no-deal Brexit; (2) a withdrawal agreement; (3) the Northern Ireland Protocol's backstop, an option assuring that the border between the UK (Northern Ireland) and Ireland remains open; and (4) a political declaration on the future relationship between the UK and EU.[5,6]

Currently, we see 3 possible options: (1) a withdrawal agreement (deal), (2) no deal or (3) a revoke of #50 (no Brexit), albeit the latter seems to be improbable.

With the first scenario, EU funding and collaborations, including a legal framework, will stay in place until December 2020. Both sides will aim for continued UK and EU research collaborations, however, terms are expected to get more challenging for the UK.

The second scenario will end EU funding and stall EU collaborations. Considering the most current political climate, the no deal scenario seems far more likely than a revoke of #50. However, The British Medical Association, British Medical Journal and the Royal College of Nursing continue to insist on a second Brexit referendum.[7] A second referendum or a revoke has, however, been thus far declined by the Government.

Current evaluations show that all variations of Brexit will have negative consequences for the UK's position in healthcare and health-related research, with the most detrimental effect in case of a no-deal Brexit.

As the UK is a significant beneficiary of EU-funding, the UK government announced their efforts to guarantee EU-funding beyond the official Brexit date, at least up to the end of Horizon 2020.[8] The UK government also announced to explore the possibility of creating an international research fund to fill the gap when EU-funding opportunities are lost after Brexit.[9] From a scientific perspective, allowing Britain to participate in the Horizon 2020's successor "Horizon Europe" as an "associated" country is expected to significantly limit Brexit's impact. The status of "associated" country would enable UK-based researchers to be part of ERC projects, a status currently held by non-EU countries such as Norway and Switzerland. However, a series of side-deals and compromises will be essential to soften the blow on research and innovation for both the UK and the EU.

From a clinical perspective, Brexit could have a forceful impact on organ donation and transplantation in the UK. While international donation and transplantation societies are thriving, UK-based researchers could face difficulties when pursuing international collaborations.[10] Shapey and co-workers detailed the areas of potential impact on clinical transplantation in case of a Brexit extending to (1) existing EU-wide legislation, (2) regulation and governance, with requirements and standards of quality and safety for organs, (3) existing organ-sharing networks, (4) pan-European initiatives, including EU-funding for research and cross border initiatives to increase donation rates, (5) EU efforts to combat organ trafficking and transplant tourism, and (6) legal status for EU-citizens working as clinicians and/or researchers in UK transplant centers.[11]

Summary

With nearly 11% of transplantation research-related EU-funding and the involvement of UK-based researchers in almost half of all EU-funded projects, the UK plays an important role in transplantation research and UK-based researchers have an important position within the EU research community.

Brexit, the UK's impending departure from the European Union, is expected to have a detrimental impact not only the scientific community in the UK but also on the continental European countries.

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Textbox methods:

Information on EU-funding was collected utilizing the Publications Office of the European Union (CORDIS) database (1988 – 2019). To assess international collaborations, a bibliometric analysis of scientific publications from transplantation journals was performed, using the Web of Science database (1999 – 2019). An elaborate description of the methodology is provided as a Supplement.

Figure 1: Percentage of EU-funded projects by coordinating country

Figure 2: EU-funded projects and coordination/participation by UK based researchers

Figure 3: Number of single country and multiple country publications (1999-2019).

Figure 4: Numbers of publications shared with UK based authors

Figure 1

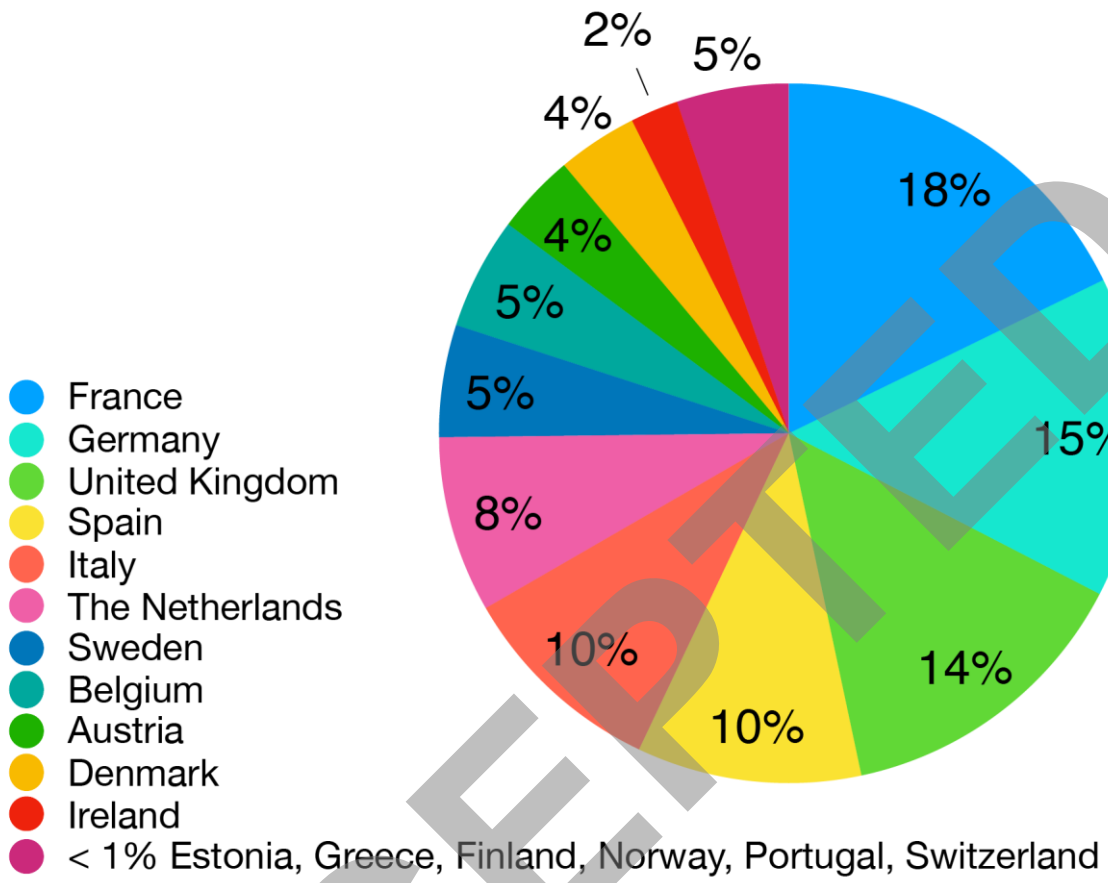

Figure 2

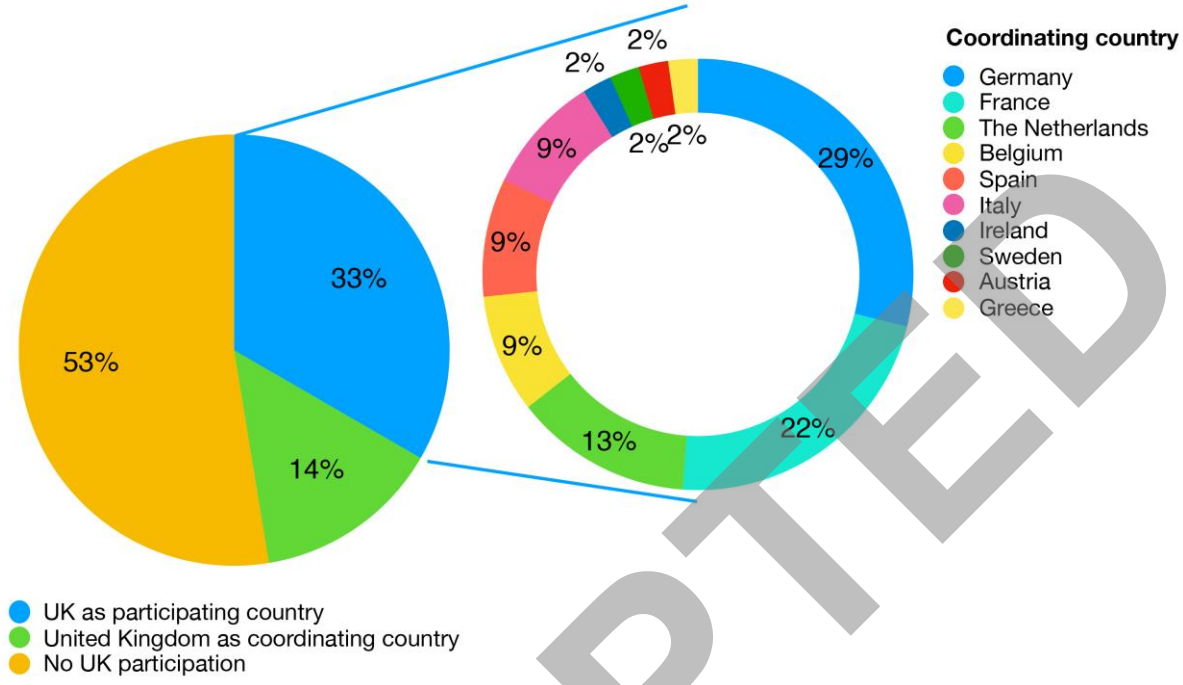

Figure 3

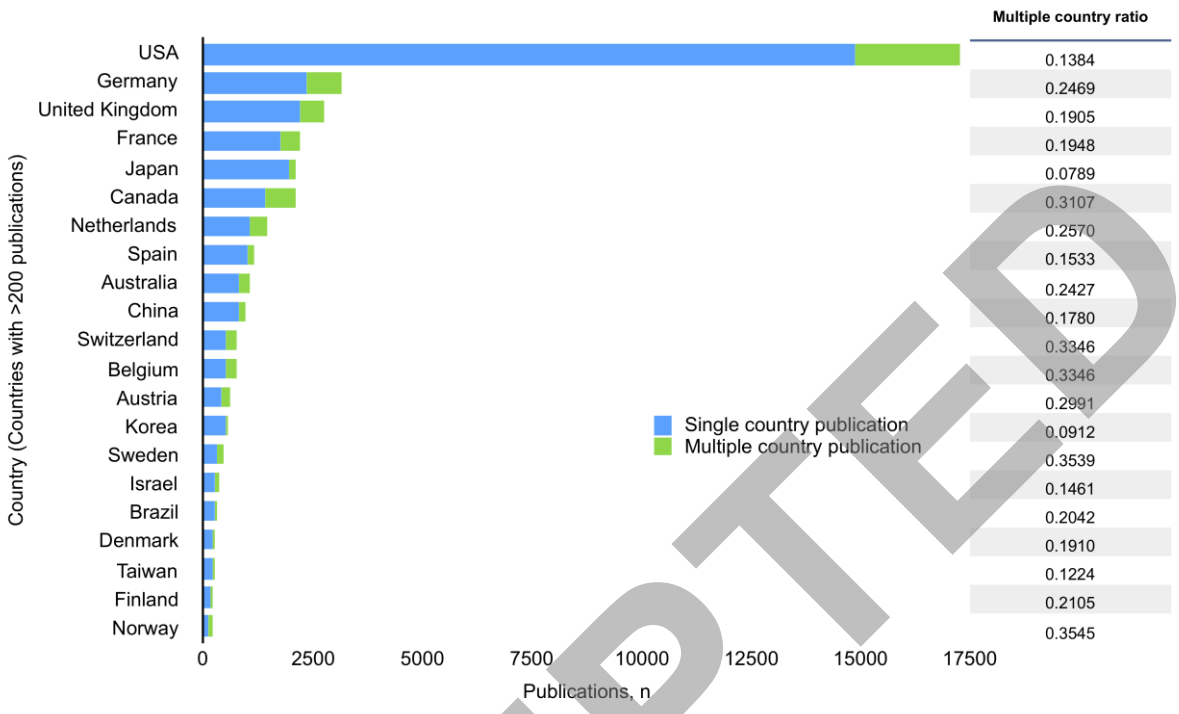

Figure 4